

GREAT DISMAL SWAMP NATIONAL WILDLIFE REFUGE  
Suffolk, Virginia

ANNUAL NARRATIVE REPORT  
Calendar Year 1979

NATIONAL WILDLIFE REFUGE SYSTEM  
Fish and Wildlife Service  
U.S. DEPARTMENT OF THE INTERIOR

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1. Ralph M. Keel, Jr.	Refuge Manager	GS-12	PFT	
2. Mary Keith Garrett	Assistant Manager	GS-9	PFT	
3. Douglas L. Parr	Assistant Manager	GS-7	PFT	
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5. Kriste L. Steinhauer	Outdoor Rec. Planner	GS-5	PFT	
6. Bailey White	Eng. Eq. Operator	WG-10	PFT	
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8. Howard T. Rybolk	Appraiser (R.O.)	GS-12	PFT	
9. Donald J. Schwab	Wildlife Biologist	GS-7	TFT	LDOD 2/24/79 Transferred Great Swamp N.W.R.
10. Gerald E. Meier	Bio Tech	GS-5	TFT	LDOD 5/5/79
11. Thomas E. Everly	Bio Aid	GS-4	TFT	LDOD 3/24/79
12. Carolyn S. Burns	Bio Aid	GS-4	TFT	EOD 2/11/79
13. Anna Nora Casey	Bio Aid	GS-4	TFT	EOD 2/11/79 LDOD 8/11/79
14. Mary K. Ash	Coop Student	GS-4	TFT	EOD 10/7/79
15. Brian E. Hostetter	Math Aid	GS-4	TFT	EOD 7/1/79
16. Dalton M. Parker	Laborer	WG-4	TFT	EOD 6/3/79 LDOD 7/29/79
17. Joyce L. Williams	Maint. Worker	WG-4	TFT	EOD 6/3/79
18. Johnnie C. Daniels	Laborer	WG-4	TFT	LDOD 8/17/79
19. Michael R. Bryant	Maint. Worker	WG-4	TFT	EOD 10/21/79
20. William D. Lurvey	Maint. Worker	WG-4	TFT	EOD 10/21/79

Review and Approvals

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Submitted By Date

Great Dismal Swamp NWR  
Refuge

R. R. Randolph 4/19/82  
Area Office Date

Edward S. Moses 4/28/82  
Regional Office Date



U.S. Geological Survey Personnel

1. Patricia T. Gammon	Botanist	GS-9	PPT
2. Thomas M. Gwynn III	Hydrologic Field Asst.	GS-4	TI
3. Linda Scott	Hydrologic Field Asst.	GS-3	PI



Young Adult Conservation Corps Leaders

1. Sam Marshall	Camp Leader
2. Dalton M. Parker	Group Leader

GREAT DISMAL SWAMP NATIONAL WILDLIFE REFUGE

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## I. GENERAL

### A. Introduction

The Great Dismal Swamp National Wildlife Refuge was established in February, 1973, with the donation of 49,100 acres by the Union Camp Corporation to the Service through The Nature Conservancy.

The refuge, presently at 80,981 acres, offers important ecological, educational, historical, and recreational values and is a peaceful contrast to the nearby heavily populated urban areas.

The Dismal Swamp, which is actually a forested palustrine wetland, has been greatly altered by miles of spoil bank roads, uncontrolled ditches and repeated lumbering operations. A drier habitat has resulted, and red maple now dominates much of the forest which was once covered with great stands of cypress, Atlantic white cedar and tupelo gum.

In the swamp exists a complexity of plant communities and an intermingling of northern and southern plant and animal species. Many species are seldom seen together elsewhere.

### B. Climate and Habitat Conditions

Rainfall broke all records for the region in 1979 - a total of 65.99 inches. This equaled the 100 year annual rainfall record and included the wettest spring ever recorded. All Refuge staff, YACC and YCC enrollees engaged in field work were guaranteed wet feet all year for the first time in refuge history. The impact on wildlife and fisheries was not quantified but it is reasonable to assume there was a higher level of competition for the few dry bedding/den site areas. The higher water in the ditches and lakes permitted greater dispersion of aquatic life making food supplies more difficult to catch by the predator species.

The cold and wet conditions delayed spring planting by 3-6 weeks in the agricultural fields surrounding the refuge. Most of the land had been plowed in late winter and lay exposed and vulnerable to water and wind erosion. The sediment load entering the swamp is believed to have increased considerably and probably carried with it additional fertilizers, herbicides and pesticides. These products entering the swamp were not measured nor was any extreme condition observed such as fish kill or algal bloom.

The regular summer and fall maintenance and rehab were curtailed for the year due to 111 days actual rain (30% of the year). Additional working days were lost waiting for roads to dry out adequately to permit access to work sites as well as waiting for dryer conditions to perform necessary road maintenance.

The winter temps were within normal ranges with very little precipitation in the form of snow. No habitat changes occurred in the winter as a result of excessive rainfall since the swamp is normally inundated for the 4-6 winter months.

Rainfall Data\*

<u>75-79</u>	<u>Average</u>	<u>1979</u>
January	5.21	6.46
February	3.61	7.71
March	4.62	4.49
April	3.51	5.18
May	6.49	8.69
June	4.30	3.81
July	5.25	7.07
August	2.69	4.31
September	3.82	7.33
October	3.79	4.16
November	3.64	5.50
December	<u>3.51</u>	<u>1.28</u>
Total Rainfall	50.44	65 .99

\* Army Corps of Engineers

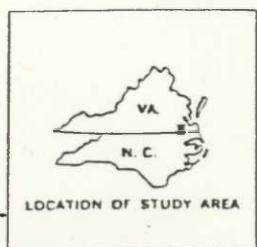
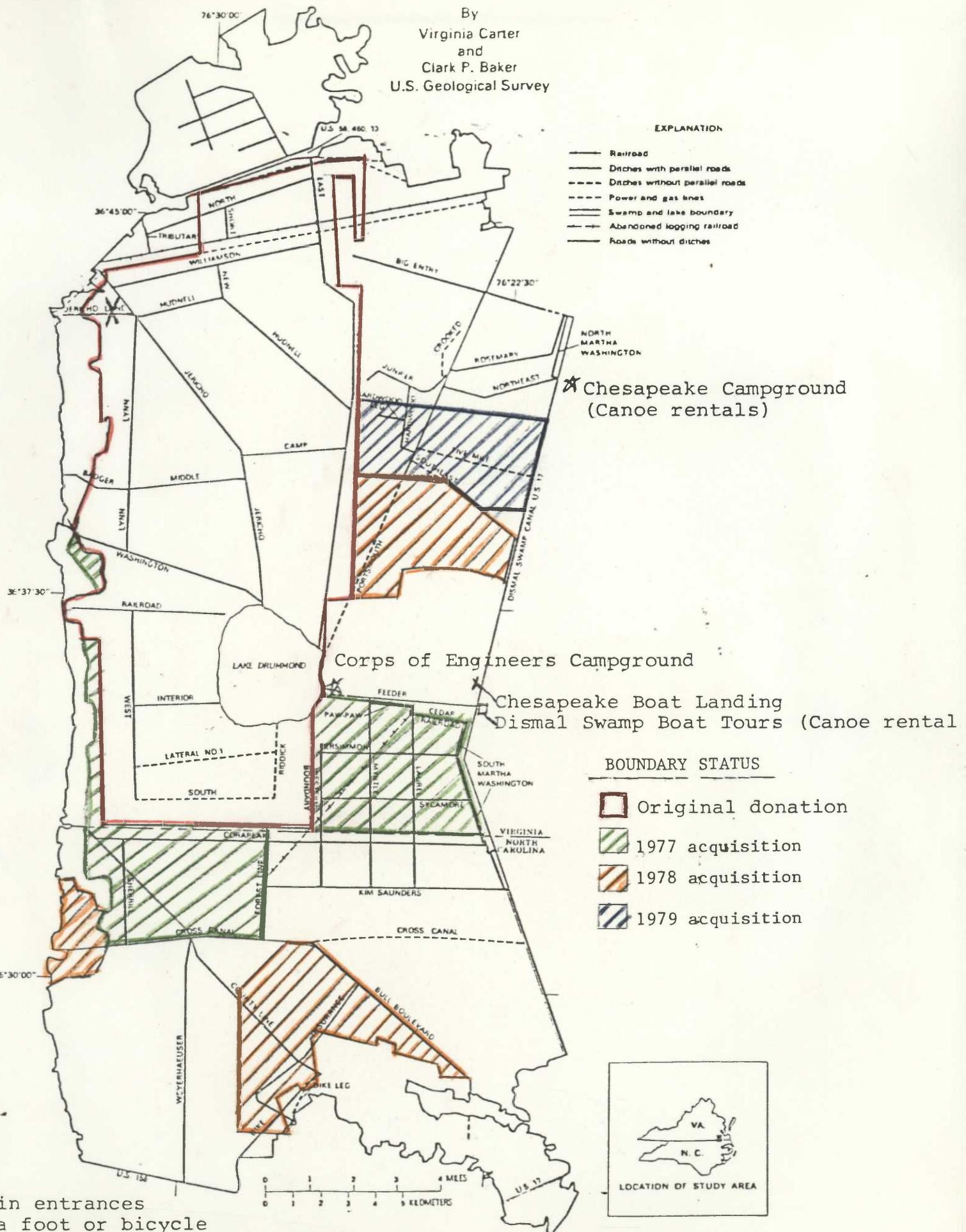
C. Land Acquisition

Addition of the Atlantic Farms tract in 1979 brought the total area of the Refuge in Virginia to 67,604 acres. This 5000 acre property was purchased for \$2,500,000.00. No lands were acquired in North Carolina in 1979; in fact, the acreage in this state was adjusted down from 13,399 to 13,377. Thus the total area of the Refuge in both states as of January 1, 1980 was 80,981.

Acquisition will continue to expand the Refuge to an estimated 109,000 acres as recommended in the Dismal Swamp Study (P.L. 92-478). The remaining acreage being reviewed for acquisition is held in 80 separate ownerships. Present negotiations are only with willing sellers.

Of the 19 cabins that are inholdings, only 6 are now in private ownership. Permits to use these cabins ended as of January 1, 1980. 3 of the 6 are in the process of being acquired and negotiations are expected to be completed in 1980.

By  
Virginia Carter  
and  
Clark P. Baker  
U.S. Geological Survey



D. System Status

1. Objectives

The primary purpose of the Great Dismal Swamp National Wildlife Refuge, as contained in the recommendations pursuant to Public Law 92-478, is to "protect and preserve a unique and outstanding ecosystem, as well as to protect and perpetuate the diversity of animal and plant life therein".

A secondary objective will be to establish a public-use program compatible with primary refuge objectives. Refuge management programs will, of necessity, include water management, forest management, fire management and public use management.

The refuge at present is being operated under the broad mission objectives previously mentioned. Quantified objectives will be prepared during the master planning process scheduled for FY82.

A fire management plan was prepared in December of 1978 and reviewed and approved by the Area and Regional Offices during CY79.

A five-year funding pattern for Dismal Swamp Refuge is shown below.

	N&NMB	I&R	End. Spp.	Total	Job Order(BLHP)
FY'76	\$ 48,500	\$67,500	\$8,200	\$124,200	\$207,000
FY'77	\$123,000	\$68,500	--	\$191,500	\$248,900
FY'78	\$134,000	\$81,300	--	\$215,300	\$371,018
FY'79	\$154,000	\$86,000	--	\$240,000	\$163,000
FY'80	\$200,000	\$84,000	--	\$284,000	\$442,000

The FY-80 figures represent an \$8000 cut (1220-\$5000; 1240-\$3000) from the funding advice on which we programmed our 80 Annual Work Plan. In spite of the funding cuts, this station has been fortunate in its level of support from BLHP, YACC and YCC programs. BLHP has enabled us to acquire needed heavy equipment, contact with USGS to gather data on water inflow-outflow and begin to replace some 70 water control structures. The youth programs have provided sorely needed staff to maintain and rehab roads and construct our first major public use facility - the Dismal Town boardwalk trail. Our weakest point is lack of permanent maintenance personnel with trade skills necessary to maintain our equipment, roads, water control structures and public use facilities as they are completed or acquired.

## II. CONSTRUCTION AND MAINTENANCE

### A. Construction

A contract was awarded Shamrock Construction for the bulkheading project on Washington Ditch at the Jericho Ditch intersection. Construction began on July 12th, however the contractor soon discovered that jetting the pilings in would not work. The pilings were subsequently driven into position, after consultation with Don Holmes from the regional office.



Regional Office Engineers Pete Elliot and Ben Rizzo inspect completed bulkhead with Assistant Manager Garrett and Refuge Manager Keel.

A transportable deer check station was built to be used during the refuge deer hunts. This project was headed by maintenance worker Bryant and completed with YACC assistance. Several hunter foot bridges were constructed by the refuge staff for use during the 1979 deer hunt.

B. Maintenance

Road maintenance is generally a major activity for the refuge and this year was no exception. During 1979 50 miles of road were mowed, 34 miles of road were graded, and 5 miles of brush and trees were cleared from roadsides. Spot filling of the holes along Lynn, Jericho, Camp, Railroad, West, and Interior Ditch roads was completed.

YACC maintenance activities included road rehabilitation and maintenance, equipment and vehicle maintenance, and foot bridge rehabilitation.



D-6 Bulldozer clearing brush and trees from roadsides to speed up the "drying out" of roads by opening the area to more sunlight.

C. Wildfires

Due to the above average amount of rainfall and the accompanying wet conditions there were no wildfires within the refuge. New firefighting equipment purchased with BLHP funds included a trailer mounted fire pump, a power unit for Crisafulli pumps, and a new low boy.

### III. HABITAT MANAGEMENT

#### A. Croplands

Nothing to report.

#### B. Grasslands

Nothing to report.

#### C. Wetlands

Nothing to report.

#### D. Forestlands

Two areas of forest lands were treated to kill red maple. With the help of YCC enrollees 3 acres of encroaching maples in the remnant marsh were treated with Tordon (2 ac) and Roundup (1 ac). four and one half acres of a viable cypress gum community were treated for the highly competitive maple. Unfortunately the results were very disappointing. The maple trees showed little effect from the chemicals. Next year we plan to test different, more stringent methods.

The road and ditch clearing activities produced an ample supply of firewood. Permits were issued to the public on first come/first serve basis for collection of firewood. In addition, several cords of firewood were delivered to the Salvation Army by the YACC enrollees.

#### E. Other Habitat

Nothing to report.

#### F. Wilderness

Nothing to report.

#### G. Easements for Waterfowl Management

Nothing to report.

#### IV. WILDLIFE

##### A. Endangered and/or Threatened Species

Of foremost importance during 1979 was the sighting on November 30 by YACC Group Leader Sam Marshall and 2 enrollees of a cougar as it crossed Persimmon Ditch Road in front of their vehicle. The sighting occurred at a distance of approximately 25 yards, along an undisturbed sight line.

Since then we have received information that another sighting was unreported (and another has been reported since the beginning of 1980).

Eastern cougar? or released cougar? We don't know yet. In fact, we have not come up with any supporting evidence yet.

The only other endangered species known to exist in the area, the bald eagle, was last reported nesting in the swamp in 1961, by Brooke Meanley.

##### B. Migratory Birds

###### 1. Waterfowl

The Dismal Swamp National Wildlife Refuge is one of the few refuges in the system that receives no migratory bird money. This fact should give an indication of the importance of waterfowl to the refuge.

However, we still conduct regular censuses to determine relative abundances and the presence or absence of species.

Primary users of the swamp ditches are the wood duck, but we also record fairly regular sightings of mallard, black duck, and hooded mergansers.

Lake Drummond is used primarily as an infrequent resting area for whistling swan, Canada geese, mallards, black ducks, and scaup, as well as a small coot population that winters there.

###### 2. Marsh and Water Birds

Most common species recorded in 1979 include the green heron and great blue heron, with some American bittern also recorded.

###### 3. Shorebirds, Gulls, Terns, and Allied Species

Sporadic use is made of Lake Drummond by herring gull, ring-billed gull, great black-backed gull, and laughing gull.

#### 4. Raptors

Some 11 species (see pub. Birds of the Dismal Swamp) are known to use the Refuge at different times of the year.

#### 5. Other Migratory Birds

In 1979 a breeding bird census started in 1978 by Wildlife Biologist Don Schwab was continued by Tom Gwynn, U.S.G.S. HFA. The study was conducted in a red maple-black gum area over a two month period (May - June). The predominant nesting species were found to be: prothonotary warbler, wood thrush, ovenbird, northern waterthrush, and hooded warbler. Other species observed included great crested flycatcher, Carolina wren, Carolina chickadee, white-eyed vireo, red-eyed vireo, Pileated woodpecker, hairy woodpecker, downy woodpecker, and common flicker. The results of this survey appeared in the September issue of American Birds.

On May 6, 1979, the 3rd Annual Dismal Swamp Spring Bird Count took place, with 26 participants, including 5 refuge staff. The count used a technique similar to the U.S. Fish and Wildlife woodcock survey, with each of 9 groups moving 0.25 miles down a road, stopping and counting all birds seen and heard for 15 minutes. This count covered 27.5 miles of road and recorded 98 species of birds within the refuge.

### C. Mammals & Non Migratory Birds & Others

#### 1. Game Mammals

The Dismal is home to a variety of game mammals, primarily white-tailed deer, gray squirrel, cotton-tail rabbit, and black bear.

The hunting program for deer was revived in 1979, with 5 days of controlled hunting permitted on 16,000 acres of the refuge. Two hundred and fifty-five hunters harvested 25 deer during the hunt.

Analysis of the kill indicated a possibility that the herd is imbalanced, being weighted toward the older (2½+) age classes. Subsequent recommendation and plans are to expand the hunt to provide increased recreational opportunities and to increase the kill to bring the herd back into a better balance.

No other hunting program is currently being considered.

#### 2. Other Mammals

Other mammals present in the swamp include mink, river otter, weasel, swamp rabbit, and bobcat. No population figures are available on these species, although sightings confirm that they are reproducing in the refuge.

#### 3. Resident Birds

Primary species of resident game birds found at the Dismal is the bob-white quail, which frequents the roadsides of the refuge.

We also get a rare report, now and again, of wild turkey, but not enough to believe they are anything more than transient inhabitants.

#### 4. Other Animal Life

Eight species of turtle, five species of lizards, nineteen species of frogs and toads, seven species of salamander, and twenty-one species of snakes have been reported from the Great Dismal Swamp. Poisonous species of snakes are the copperhead, eastern cottonmouth, and canebrake rattlesnake, with only the copperhead being seen on a regular basis.



The box turtle is one of the more commonly seen reptile species within the refuge. These two seem intent upon perpetuating the species.



The most common of the three species of poisonous snakes occurring in the Great Dismal Swamp, the copperhead.

##### 5. Fish Sample - Lynn Ditch

Determination of species composition, relative abundance, and reproductive potential of the fish population in Lynn Ditch was completed August 2, 1979. The Lynn Ditch study showed 3 species of fish with a standing crop of 142.36 lbs/acre. The average weight/fish was .33 oz. The mudminnow was the most abundant fish, while the redfin pickerel had the greatest biomass.



Members of U.S.F.W.S. Fisheries Staff from Gloucester Point sorting and measuring fish from Lynn Ditch Study.

## V. INTERPRETATION AND RECREATION

The potential of the refuge for public use is considerable but limited because of road conditions, a lack of visitor facilities, and limited staff. The outlook for public use is brighter, however, as our Public Use Development Plan was completed in September of this year. Facilities such as the Headquarters/Wildlife Interpretive Center will depend upon BLHP funding or other development funding beyond FY'82.

Total visits to the refuge decreased to 8,150 compared to 9,300 in CY'78. Many of the visitors entered by boat via the Feeder Ditch off of the Dismal Swamp Canal. The majority of visitors were on guided tours. Guided tours are necessitated by several factors:

- 1) No vehicular traffic is allowed on refuge roads except by special permit.
- 2) A hike or bicycle trip to Lake Drummond is a minimum of ten miles. Therefore, the time and energy required is prohibitive for many would-be visitors.
- 3) For visitors interested in viewing wildlife and the swamp ecosystem, there are no developed facilities near access points.
- 4) Parking facilities are absent at access points.
- 5) There are no signs directing visitors to entrance points due to budgetary restraints. Thus the resource is difficult for visitors to find.

Limited staff restricts the number of tours which can be given. Therefore, the potential and demand for public use in the swamp is not met, even with cooperating organizations conducting tours as well as the refuge.

### A. Information and Interpretation

#### 1. On-Refuge

Old Dominion University's Dismal Swamp Programs conducted tours for 1,418 visitors, making up some 62% of the environmental education carried out on the refuge. Ten teachers, elementary through college, were issued educational permits. Teachers are encouraged to bring classes onto the refuge, but they must acquire permits due to restrictions on vehicular access. All permit holders must call the Refuge office to check on the gate combinations, road conditions, refuge operations, and conflicting tours, as all Refuge roads are basically one way. These classes comprised 11% of the E.E. in the swamp. Refuge personnel conducted the remaining 27% of the E.E. tours, and almost all of the interpretive tours.

In April an environmental education teacher's workshop was offered to teachers from Suffolk and Chesapeake school districts. Twenty two teachers participated in this two day program conducted by Refuge personnel. Participants were familiarized with the biology, ecology, geology, and history of the Great Dismal Swamp. Hopefully, a few became familiar enough to conduct their own field trips.

Seventeen public relation permits were issued to various individuals for birding and photography.

A privately maintained boat tour operation provided guided tours of the Feeder Ditch and Lake Drummond to 1,264 visitors.

A new pamphlet "Birds of the Dismal Swamp National Wildlife Refuge" was printed in January.

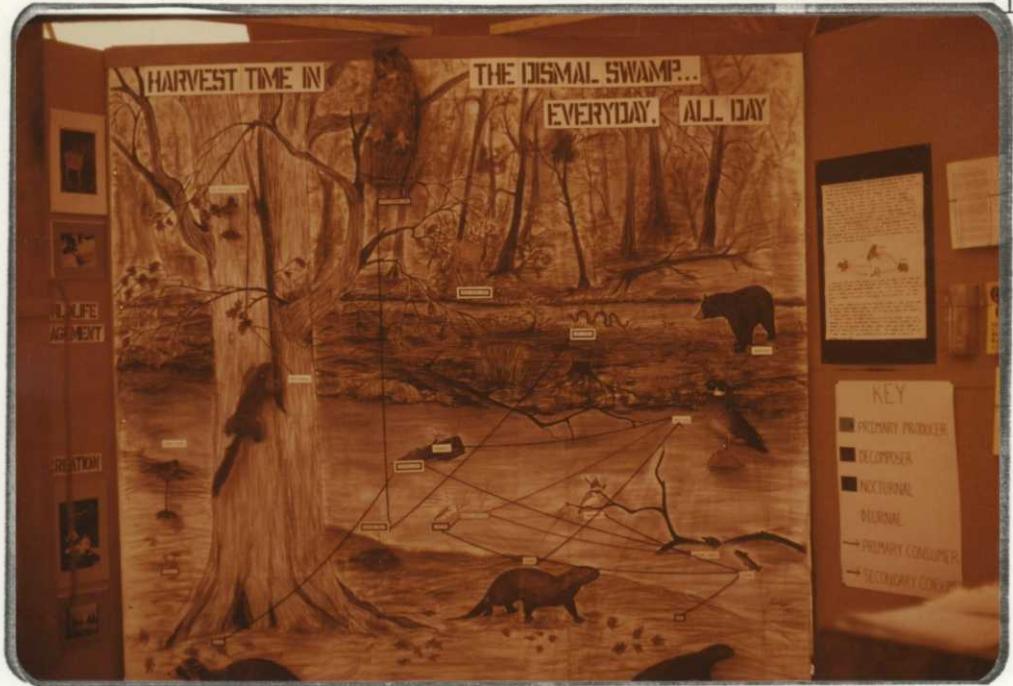
## 2. Off-Refuge

Nineteen slide shows and films were shown to 775 people in various civic groups, particularly garden clubs.

A public meeting for the Dismal Swamp Public Use Development Plan was held on June 21st at the Suffolk High School Auditorium. Sixty-six persons attended the meeting to hear the proposal as presented by the refuge staff and representatives of the area and regional offices. A presentation consisting of slides showing the location and type of structures planned for public use was given by regional office personnel. Several people representing various organizations made verbal recommendations at the meeting and indicated that they would submit written statement at a later date.

The refuge participated in the Second Annual Suffolk Harvest Festival with a display on food chains of the Dismal Swamp ecosystem. Approximately 20,000 people attended this three day event.

In cooperation with Back Bay NWR a combined display was prepared for National Hunting and Fishing Day. Rain lowered the attendance considerably.



This 8'x8' food chain mural was prepared by Bio Aid Burns for the 1979 Suffolk Harvest Festival.

## B. Recreation

### 1. Wildlife Oriented

Consumptive wildlife oriented recreation on the refuge was limited to fishing and a five day deer hunt. For many of the 4,064 (excluding boat tours) individuals recorded entering Lake Drummond, fishing was a widespread activity. Fishers may expect to catch catfish, pumkinseed, sunfish, bluegills, black crappie, and others.

The first deer hunt at the refuge since 1974 was held this year. On 16,000 acres of land, the hunt ended with 255 hunters harvesting twenty five deer for a success rate of 10%.



Weighing in one of the twenty-five deer taken in the 1979 Refuge hunt.

Hiking, biking, and photography make up the non-consumptive wildlife recreation activities. Over 80 miles of spoil bank roads adjacent to the ditches are available for hiking, and are actually the best areas within the swamp for observation of wildlife and wildflowers. Soft sandy roads make biking difficult much of the time, though it is an excellent way to see more of the swamp in less time.

Twenty six individuals participated in the third Annual Dismal Swamp Bird Count held on the Refuge in May.. Twenty seven miles of roads were covered and 98 species recorded.

## 2. Non-wildlife Oriented

Our major non-wildlife oriented recreation activity is picnicking. Cabin owners, boaters, hikers, and tour groups picnic on the shores of Lake Drummond. Camping on the refuge is prohibited but a small primitive campground on the Feeder Ditch, maintained by the Corps of Engineers, accommodated 908 campers this year.

Fifteen cabin permits were issued to cabin owners in 1979. The owners pay a yearly fee of \$25.00 to use Refuge access roads to their cabins on Lake Drummond. Cabin permits will be denied after January 1980.

Various hunt clubs were issued 23 dog retrieval (vehicle) permits. During hunting season dogs trail deer onto the refuge, and can be retrieved by their owners. No weapons are allowed on Refuge lands.

## C. Enforcement

Enforcement problems at the Refuge include boundary encroachment, illegal hunting, vandalism of gates, signs, and equipment and unauthorized trespass with motor vehicles, especially motorcycles.

Due to a limited number of trained staff and also the large size of the refuge, enforcement problems are difficult to control. However, we have received outstanding cooperation from personnel of the Virginia Comission of Game and Inland Fisheries and from the Richmond SRA Office, Division of Law Enforcement.

A Summary of violations prosecuted and disposition is as follows:

<u>Offense</u>	<u>Disposition</u>
Possession of firearm	\$100
2 Hunting without a license	25
2 Unauthorized trespass	25

## VI. OTHER ITEMS

### A. Field Investigations

1. James A Quinn, Ph.D., Rutgers University. Title: The Genetic Variation and Introgression in Allopatric and Sympatric Populations of the Pond Pine and Loblolly Pine in New Jersey, Delaware and the Dismal Swamp of Virginia and North Carolina. Dr. Quinn was able to separate the hybridized strains of these species. This work will aid in habitat management in the Dismal Swamp when we begin active manipulation of the physical parameters. We will be able to select our seed source more critically to insure survival and production of the pine in the Dismal Swamp - (on going study)
2. R.F. Christman, Ph.D., Dept. of Public Health, University of North Carolina. Title: Chlorination of Aquatic Humic Substances (EPA Funded). EPA found that the chlorination of waters high in organic substances produced carcinogenic trihalomethanes. The demand for drinking water in south-eastern Virginia and northeastern North Carolina has prompted the review of waters discharged from the Dismal Swamp for potential city water supplies. This work contributes to the advancement of knowledge in this field of public health - (on going study)
3. Joseph F. Merritt, Ph.D., Old Dominion University. Title: Survey of Species Composition, Distribution, and Relative Abundance of small mammals in the Dismal Swamp. Dr. Merritt began to review the small mammal populations in selected habitats throughout the swamp. During the work he accepted a position with Cornell University. Robert K. Rose Ph.D., Old Dominion University is continuing this work.
4. Brooke Meanley, FWS, Patuxent, Retired. Title: The Ecology of Swainson's and Wayne's Warblers in the Dismal Swamp. Mr. Meanley is continuing his work on these species developing a better understanding of habitat selection and fledgling success.
5. Gary M. Williamson, Amateur Herpetologist. Title: Survey of Atlantic White Cedar for the Presence of the Pine Barrens Treefrog (Hyla Andersoni). Mr. Williamson has attempted to locate this federally endangered species for several years with no success as yet. Efforts will continue as this frog is found both to the north and to the south of the Dismal Swamp.

6. Frank P. Day, Ph.D., Old Dominion University. Title: Productivity and Mineral Cylcling in the Trees and Shrubs of the Dismal Swamp. The nutrient availability in wetlands is known to be limited due to the anaerobic decomposition process. Dr. Day is funded by the National Science Foundation to investigate the limiting factor in nutrient availability to the vitality and productivity of selected communities in the swamp. Several papers have been published and additional studies are ongoing.
7. Lytton J. Musselman, Ph.D., Old Dominion University. Title: Investigation in biosystematics of the log ferns Dryopteris in the Great Dismal Swamp. The Dismal Swamp has provided the worlds only fertile population of the hybrid Dryopteris Australis (Dismal Swamp Log Fern). Dr. Musselman is reviewing the mechanisms of hybridization of this genus in an ongoing study.
8. Harold G. Marshall, Ph.D., Old Dominion University. Title: Seasonal species composition and relative densities of phytoplankton in Lake Drummond and the ditches of the Dismal Swamp.

The dark, highly acid waters in the swamp limit the phytoplankton populations to relatively few highly adapted genera. The phytoplankton is the base of the food chain for our aquatic environments and this primary information will assist in developing several management programs for wildlife and public use.
9. William Hartgroves, Amateur Lepidopteris Specialist. Title: Survey Seasonal Populations and Special Composition of the Butterflies of the Dismal Swamp. Mr. Hartgroves has been working on the butterflies of this region since 1974. He is comparing the changes in population since Clark's work in the 1930's, and is extrapolating the changes in available larval food supply. This study gives us some direct evidence in the vegetative composition of the Dismal Swamp prior to the majority of the timbering and clearing.
10. Virginia P. Carter, Biologist, and Patricia T. Gammon, Botanist of the U.S. Geological Survey have been conducting wetland research in the swamp for five years. Remote sensing investigations include the use of Landsat satellite data to classify the vegetation and evaluation of the accuracy of these classifications to determine their usefulness for a variety of wetland applications.

The hydrology of the swamp and its relationship to vegetation is being studied by use of ground water observation wells and delineation of surface water in the ditches and throughout the swamp. Vegetation, hydrology and soils of the western boundary transition zone are being investigated to characterize and define the zone between wetland and upland.

11. Ronnie M. Pierce, Master's Degree Candidate, Old Dominion University, Title: Seasonal Feeding Habits of the River Otter in the Dismal Swamp. Ms. Pierce is collecting otter scat throughout the swamp and analyzing the contents for prey species. The river otter is designated a species of special concern in both Virginia and North Carolina. This is an ongoing study.
12. James D. Lawres, Ph.D., George Mason University. Title: Corticolous Lichen Substrate Ecology in the Dismal Swamp.
13. C.E. Turner, Ph.D., Virginia Polytechnic Institute and State University. Title: Survey of Dragonflies of the Dismal Swamp. Dr. Turner is one of several entomologists who have studied the species composition and relative densities of aquatics in the Dismal Swamp. The dragonflies are of interest due to their voracious predatory appetites as aquatic immatures. The adult population densities correlate directly to available prey in the ditches of the swamp. This ongoing study enhances our understanding of the aquatic food chains.
14. Gerald F. Levy, Ph.D., Old Dominion University. Title: Artificial Inoculation of Loblolly Pine with Red Heart Disease, Fomes Pine. (funded by FWS) - Red heart disease is a critical element in the habitat suitability for the endangered red cockaded woodpecker. Dr. Levy was successful isolating the fungus and inoculating healthy trees. This work confirms our ability to manage for the red cockaded woodpecker in a time frame shorter than that required for natural infection of the disease.
15. Linwood Parker, Rudolph Badger, Resident Fishermen for the past 70 years. Title: Creel Survey of the Ditches of the Dismal Swamp. No formal studies of the fishery of the ditches had been conducted prior to 1968. The only method to establish changes in the fish population was to evaluate the angling success of people who have fished the ditches for the past 30-50 years. Mr. Parker and Mr. Badger found extremely limited success indicating a reduction in the fishery of the ditches.
16. Roy L. Ingram, Ph.D., University of North Carolina. Title: Peat Depth, Distribution and Characteristics in the Dismal Swamp of North Carolina. (funded by Dept. of Energy) The objective of this study for DOE was to review the energy potential of the organic soils. The refuge benefited from the mapping effort which included the location and depths of the organic soils and location of the subsurface channels. In addition, information on water holding capacities, ash content and structure aid in evaluating sites for habitat management.

17. Robert C. Harriss, Ph.D. NASA, Langley Research Center, Title: Methane Production and Biological Controls from the Soils of the Dismal Swamp. Dr. Harriss was reviewing the products of anaerobic metabolism in the organic soils. This work relates to nutrient cycling as well as the survival of the vegetation growing on the surface. Preliminary results showed methane production at #5 highest levels in the month of January. This phenomena has not been observed in any other system. The bacteria that produce the methane are at their lowest level of productivity during the winter months. This is a continuing study.
18. Additional ongoing studies -
  - a. Appalachian Trail Club - Location of cross country hiking trail.
  - b. Gerald F. Levy Ph.D., Old Dominion University. The use of mirafi 5DOX fabric as trail underlayment to reduce compaction of organic soils.
  - c. Additional to species lists of plants, birds, insects.

B. Cooperative Programs

1. YCC

The 1979 YCC Camp had a complement of 20 enrollees and 5 staff for the eight week program. Primary objectives for the enrollees were boardwalk trail construction and foot bridge installation. The YCC work on the Dismal Swamp boardwalk trail progressed satisfactoraly with YACC supervision and assistance. Six foot bridges, to be utilized during the deer hunt, were completed by YCC crews. Regeneration counts on two Atlantic White Cedar clear cut areas were completed and several wind-blown and dead-standing cedars were salvaged to be used for other projects. All YCC enrollees and staff were given an 8 hour Red Cross multimedia first aid course. The most memorable event during the camp was when one crew leader and five enrollees got lost while working on a TSI project on an overcast day. Fortunately, the enrollees stayed together as instructed and were located before nightfall.

2. YACC

The YACC program worked on a multitude of projects in CY 1979, many of which the refuge could not have completed or even initiated with the current staff. Major projects included boardwalk construction, road mowing, road rehab, cutting trails for survey crews, installation of staff gages, deer hunt posting, and construction of deer check station. Several YACC enrollees assisted during 1979 deer hunt by checking in deer, checking hunter permits and licenses, and pulling out stuck vehicles. A 30"x30"x6' rear projection screen box was constructed by the YACC for use in public displays by the refuge.

### C. Items of Interest

Personnel changes include:

- Don Schwab, Wildlife Biologist accepted an Assistant Manager's position at Great Swamp NWR in New Jersey
- Anna Casey and Carolyn Burns, EOD'd 2-11-79 as Bio Aids
- Tom Everly, Bio Aid, terminated 3-24-79
- Gerald Meier, Bio Tech, terminated 5-5-79
- Murray Parker and Joyce Williams, Maintenance workers, EOD'd 6-3-79
- Brian Hostetter, Math Aid, EOD'd 7-1-79
- Murray Parker, Maintenance worker, LDOD'd 7-29-79 to accept Group Leader position with Dismal Swamp YACC
- Ted O'Neal, Refuge Forester, resigned effective 8-10-79
- Mary Ash, Student Trainee, EOD'd 10-7-79
- Johnnie Daniels, Maintenance Worker, LDOD'd 8-17-79
- Michael Bryant and Bill Lurvey, Maintenance Workers, EOD'd 10-21-79
- Kriste Steinhauer, Outdoor Recreational Planner, accepted a transfer transfer and promotion to Eastern Neck NWR effective 12-2-79

### Training/Workshops Attended

Doug Parr - Tour weeks training at Refuge Academy in Beckley, West Virginia

Kriste Steinhauer - FWS I&R workshop and annual AIN Conference in Bloomington, Minnesota

Ralph Keel - North Carolina Fire Fighting Cooperator Training School in Plymouth, North Carolina

Area Conference, Ocean City, Maryland

Four weeks of law enforcement at FLEIC, Glynco, Georgia

Cluster meeting at Elizabeth City State University as part of stations EEO effort, Elizabeth City, NC

OPM training sessions on Management of Time and Communicating, Person to Person, Norfolk, VA

Ted O'Neal - North Carolina Fire Fighting Cooperator Training School in Plymouth, North Carolina

Virginia Polytechnic Institute and State University Forestry Symposium, Blacksburg, Virginia

Mary Keith Garrett - Area Conference at Ocean City, Maryland

Training in digitizing computers and complete point location data at USGS National Center, Reston, Virginia

Bailey White - North Carolina Fire Fighting Cooperator Training School, Plymouth, North Carolina

### D. Safety

In January 1979, a refuge safety committee was formed, consisting of four staff members, to make recommendations on safety matters.

A lost time accident occurred at Dismal Swamp NWR May 1st, when YACC leader Sam Marshall suffered a machete cut on the knee. Surgery was required, but Sam will return to work on May 29.

There have been two Refuge vehicles involved in accidents during the past month. A refuge lowboy trailer scraped the fender and front

bumper of an illegally parked pick-up truck, and another vehicle removed a private mailbox with its side mounted antenna.

Radio communications at Dismal Swamp continue to suffer. Due to as yet undetermined causes, we have been unable to transmit on our base station. This has compounded problems of what was previously a marginal communications system at best.

NANSEMOND NATIONAL WILDLIFE REFUGE

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## NANSEMOND NATIONAL WILDLIFE REFUGE

### I. GENERAL

#### A. Introduction

Nansemond Refuge was transferred to the U.S. Fish and Wildlife Service on December 12, 1973, from the Department of Defense. The following is a complete description.

#### 1. Location

This refuge is 207.51 acres of brackish, tidal marsh in four parcels declared surplus by the General Services Administration. Two of the parcels are contiguous and the other two are separated by only a few hundred feet by Navy access properties. The parcels are about five miles northwest of Dismal Swamp National Wildlife Refuge and 30 miles west of Back Bay National Wildlife Refuge. The study areas are found on the U.S.G.S. Quadrangle 1:24,000 map for Chuckatuck, Virginia. See attached map.

#### 2. General Description

The Nansemond Refuge is nearly 100 percent tidal marsh. The marshes are salt to brackish of excellent quality. Parcels A, C, and D have over a mile of frontage and some bottom along the Nansemond River and Oyster House Creek. Parcel B is bounded on three sides by Star Creek, feeding into Oyster House Creek and then into the Nansemond River. Adjacent property is owned by the U.S. Navy. There are no developments encroaching upon these marshes. The vegetation is dominant Spartina patens with Spartina alterniflora in the lower areas. There are numerous tidal guts, pans, and potholes providing excellent interspersion of types. Edge vegetation grades from salt marsh grasses to tide bush and low value trees. Parcel B has a wide hedge and about two acres of open field on its south line. The area receives considerable use by waterfowl. Food and cover are provided for a variety of fish and wildlife, including herons, egrets, ospreys, bald eagles, squirrels, rabbits and a myriad of forest, edge, and marsh dwelling passerine birds.

#### 3. Geology

The area comprises a portion of the eastern shoreline of the Nansemond River estuary. The base formation under the area is the Yorktown formation of marl of the Miocene Period near the contact line of the coastal and estuarine sand and gravel formation prevalent along the Eastern seaboard from New Jersey to Texas. The soil in the study area is a rich peat at the surface with contiguous upland areas of estuarine sands and

gravels with loamy sand at the surface. Average rise and fall of the tide is about four feet.

#### 4. Topography

The area is flat tidal marsh with limited edge areas of low, rolling upland. Elevations vary from msl to 20' msl.

#### 5. Climate

The climate is oceanic, subject to fogs and storms, but is tempered by the moderating effect of the Atlantic Ocean. Temperature extremes range from 8°-95°. The average summer temperature is 80°, and average winter temperature is 50°. Average annual rainfall is 48 inches with 3 inches in one 24-hour period the average maximum rate. Average annual snowfall is 8 inches, with 210 frost-free days. The last frost averages April 1 and first frost October 15.

#### 6. Biological Characteristics

##### a. Water and Marsh Areas

The area is about 95% unditched high quality salt marsh, 4% open water and 1% upland. The marsh is tidal of high quality. Dominant vegetation is Spartina patens and Spartina alterniflora in the lower marsh locations. Some upland edge areas have patches of phragmites and salt tide bush; the latter is also growing along natural levees of Oyster House Creek. The soil is peat over marl of unknown depth.

##### b. Upland Area

About two acres (1%) of the study area is upland. It is a portion of a cropped field with a natural hedge of timber on its west, north, and east sides. The field is level and the soil is sandy loam, sand, and gravel with small cobbles.

#### B. Climatic and Habitat Conditions

The effect of the 1980 drought on water levels and vegetation is not known at this time.

#### C. Land Acquisition

None

#### D. Systems Status

This station is not funded; our only activity is to monitor the environment and the wildlife use.

## II. CONSTRUCTION AND MAINTENANCE

- A. Construction - none
- B. Maintenance - none
- C. Wildfire - none

## III. HABITAT MANAGEMENT

- A. Croplands - none
- B. Grasslands - none
- C. Wetlands - none
- D. Forestlands - none
- E. Other Habitat - none
- F. Wilderness and Special Areas - none
- G. Easements for Waterfowl Management - none

## IV. WILDLIFE

### A. Endangered and Threatened Species

The area offers important acres of excellent potential nesting habitat for osprey and bald eagle. The entire study area is excellent food hunting habitat for osprey and bald eagle.

### B. Migratory Birds

#### 1. Waterfowl

Oyster House Creek and the Nansemond River are wintering areas for black ducks and some divers. Limited census records indicate the area appears to be excellent wintering and migration habitat for Canada geese, canvasbacks, black ducks, and other waterfowl species.

#### 2. Other Migratory Birds

Common gallinule, clapper rail, Virginia rail, and sora rail were observed and/or heard on the area. Also seen were green heron, common egret, and great blue heron. Several black-crowned night herons were in the timbered edge areas.

C. Mammals and Non-Migratory Birds

1. Mammals

a. Upland Big Game

Whitetail deer tracks were noted along the field edge.

b. Fur Animals

Mink, striped skunk, muskrat, river otter, raccoon, red fox, and weasel frequent the area.

c. Upland Game Animals

Cottontail rabbit and eastern gray squirrel.

d. Other Small Mammals

Meadow vole, white-footed mouse, opossum, moles, and shrews were observed in the study area.

2. Upland Game Birds

Bobwhite quail and mourning doves were abundant along the edges of the marsh and in the small upland field.

V. INTERPRETATION AND RECREATION

A. Information and Interpretation - none

B. Recreation

Because the Refuge is located on a high security naval installation, no public recreational opportunities exist.

C. Enforcement

Shortage of funds and personnel, and lack of boundary posting, severely limit our enforcement activities at this time.

VI. OTHER ITEMS

A. Field Investigations - none

- B. Cooperative Programs - none
- C. Items of Interest - none
- D. Safety - No time lost to accidents or injuries.